Math 194, Winter 2020

Homework 3 — Due Tuesday, January 28, 6 pm

1. Consider a single-period binomial model with $r = 1/5$, $S_0 = 3$, $u = 2$, $d = 1/2$, and $p = 5/7$. Let X be a European *put* option with strike price $K = \$3$, expiring at time $T = 1$. Compute the arbitrage free price of this option.

2. Consider a three period ($T = 3$) binomial model with initial stock price $S_0 = \$8$, $u = 3$, $d = 1/2$, $r = 1/10$, $p = 2/5$.

(a) Draw the binary tree illustrating the possible paths followed by the stock price process.

(b) In your diagram, record the probabilities (when the "up" probability is p and the "down" probability is $1 - p$) associated with the individual elements of the sample space Ω.

(c) List the events making up the σ-field $\mathcal{F}_1$ determined by S_1. (Be sure to include the empty set and the whole sample space.)

(d) Indicate on your binary tree the values (one for each path) of a European contingent claim whose payoff at $T = 3$ is $X = \max(S_0, S_1, S_2, S_3)$.

3. Exercise 2, Section 2.4 (page 28 of the text).